

REINSTATEMENT OF CLINOSTEMON (LAURACEAE)

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DURING A TAXONOMIC STUDY of the neotropical genus *Licaria* Aublet (Lauraceae) undertaken by H. K., it became apparent that *L. mahuba* (Samp.) Kosterm. and *L. maguireana* C. K. Allen occupy a very isolated position within the genus. They differ from all other species in having a pateriform (i.e., flat, saucer-shaped) cupule and also in the presence of an unusual hirsute leaf indument otherwise unknown in *Licaria*. Both species have an elongate panicle and very large obovate leaves, which have a narrow cordate base and which are clustered at the ends of the branches. However, there are some differences in details of flower structure between the two species. The stamens of *Licaria mahuba* are bent strongly downward, while those of *L. maguireana* are erect.

In this context, the findings of H. G. R., who is presently conducting a wood-anatomical study of the Lauraceae, necessitate some reconsideration of the affinities and the taxonomic position of the two species mentioned above.

XYLEM ANATOMY

Although the woods of *Licaria mahuba* and *L. maguireana*¹ show some general resemblance to *Licaria*, they have in common a number of specific anatomical features that render them distinctly different from this genus: wood surface oily to the touch; large, windowlike ("fenestriform") cross-field pitting between vessels and ray and axial parenchyma (FIGURE 1, a, b); and silica grains in ray cells, located predominantly in 2- to 5-seriate horizontal strands of shorter than average procumbent and marginal cells (FIGURE 1, c, d).

None of the above features was observed in any other *Licaria* of the nearly 50 specimens (representing 23 species) investigated except those of *L. subbullata* Kosterm., which contain silica grains in the rays but show none of the other characters. On the other hand, the combination of all three features occurs only in the genus *Mezilaurus* Kuntze ex Taubert. In terms of diagnostic value, priority has to be given to the particular arrangement of silica-bearing cells in the rays, by which specimens belonging to the genus *Mezilaurus* can easily be distinguished from all other lauraceous woods and, for that matter, from any silica-bearing woods hitherto observed and described (Amos, 1952; Ter Welle, 1976; Richter, unpubl.).

Although the two characters of oily surface and fenestriform crossfield

¹ Material investigated: *Licaria mahuba*, RBHw 15186, ex DREw 671, Brazil, Pará, Amapá; RBHw 15342, ex Uw 9085, Brazil, Pará, Amapá, Herb. MG 51845. *L. maguireana*, RBHw 14723, ex FOHw 14860, FDG 2704.

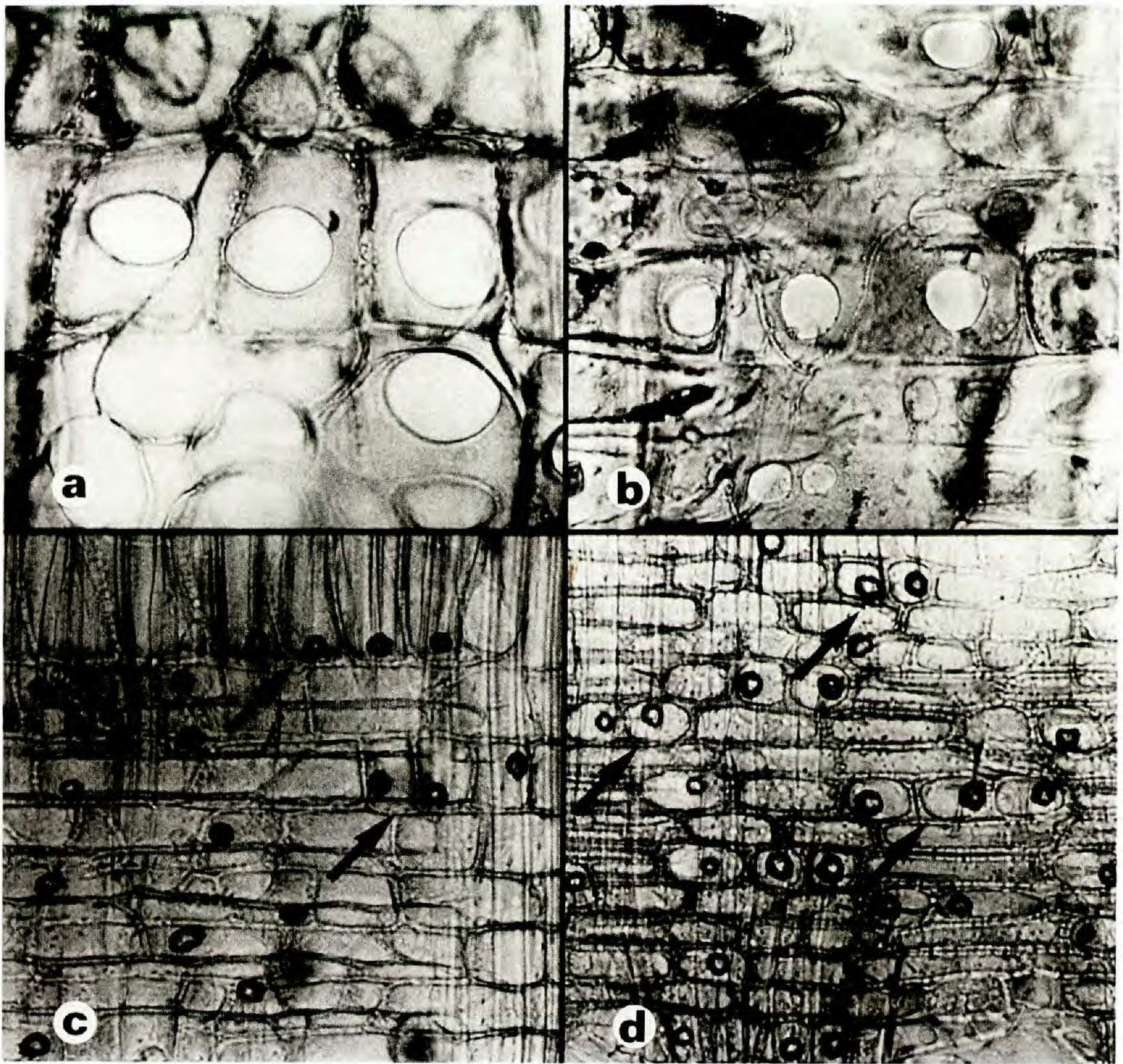


FIGURE 1. a, b, fenestriform vessel-ray pitting, $\times 225$: a, *Clinostemon mahuba*; b, *C. maguireanum*. c, d, silica in rays, individual particles located in characteristic shorter than average cells (arrows), $\times 140$: c, *Clinostemon mahuba*; d, *C. maguireanum*.

pitting can be observed occasionally in the Lauraceae, their simultaneous occurrence in combination with both the presence and the peculiar arrangement of silica-bearing ray cells readily identify the wood in question as either belonging to *Mezilaurus* or being very close to it.

While the wood of *Licaria maguireana* agrees closely with that of *Mezilaurus*, the wood of *L. mahuba* differs as shown in TABLE 1.

These differences, although largely of a quantitative nature, distinguish *Licaria mahuba* from *Mezilaurus* and might, in combination with other taxonomic evidence, warrant a taxonomically distinct status of this species. From a general structural point of view, however, it must remain close to *Mezilaurus*.

Wood anatomical evidence thus leads to the following conclusions: 1. The wood structure of *Licaria mahuba* and *L. maguireana* differs from that of all other species of the genus *Licaria* examined. 2. Specific structural features identify these two species as either belonging to the genus

TABLE 1. Physical and structural properties of the wood of *Licaria mahuba* and *Mezilaurus*.

	<i>L. mahuba</i> (2 specimens)	<i>Mezilaurus</i> (14 specimens from 8 species)
SPECIFIC GRAVITY (g./cm. ³) (air-dried specimens)	0.50–0.60	0.75–1.00
RELATION OF FIBER LUMEN (l) TO WALL THICKNESS (e)	$l \geq 2e$	$l \ll 2e$
PORES/mm. ²	6–8	(11–)16(–23)
HEIGHT OF LARGEST RAYS (mm.)	1.0–2.2	(0.4–)0.7(–1.0)
COMPOSITION OF RAYS	Decidedly heterogeneous (1 (to 3) mar- ginal row(s) of upright cells)	Homogeneous to weakly heterogeneous (1 marginal row of squarish cells)

Mezilaurus or being close to it. 3. While the wood of *L. maguireana* readily conforms to the structural pattern of *Mezilaurus*, that of *L. mahuba* occupies a more distant, yet closely related position.

TAXONOMIC EVALUATION

It is generally agreed that taxonomic entities should be based on characters that are readily observed rather than on cryptic ones. For this reason, wood anatomy can not be used as a principal tool for establishing classificatory arrangements, but it is important in testing proposed classifications. Although there is clear evidence with regard to wood structure that *Licaria mahuba* and *L. maguireana* are incorrectly placed in the genus *Licaria*, the distribution of characters of practical classificatory importance (see TABLE 2) does not suggest an obvious taxonomic solution to the problem.

The floral structure of *Licaria* is characterized by a series of reductional stages that are evidently intermediate between a more or less complete flower structure, as exemplified by *Aniba* (3 fertile stamen whorls, the innermost provided with glands), and the derived condition of *Mezilaurus*, where the androecium is represented by a single whorl of eglandulate stamens. In *Licaria* there is some variation of androecial structure between and even within species; some species conform to the pattern of *Mezilaurus*, while in others staminodia and/or stamen glands may be present. Because of this situation, the only constant diagnostic feature separating *Licaria* from *Mezilaurus* is the shape of the fruit cupule.

It is worth mentioning that, apart from *Licaria mahuba* and *L. maguireana*, there is a rather clear-cut difference between *Licaria* and *Mezi-*

TABLE 2. Comparison of morphological characters in *Licaria* and *Mezilaurus*

	<i>Mezilaurus</i>	<i>L. maguireana</i>	<i>L. mahuba</i>	Other <i>Licaria</i> spp.
CUPULE	Pateriform	Pateriform	Pateriform	Urceolate
STAMINODES (whorls I, II, IV)	Absent	Present	Present	Present in some
STAMINAL GLANDS	Absent	Absent	Present	Present in some
STAMENS	Erect	Erect	Bent downward	Erect
ARRANGEMENT OF LEAVES ON TWIGS	Clustered at end	Clustered at end	Clustered at end	Evenly distrib- uted, rarely clustered at end
INDUMENTUM OF LOWER LEAF SURFACE	Hirsute or glabrous	Hirsute	Hirsute	Glabrous, sericeous, to- mentellous, or provided with single appressed hairs

laurus, as hitherto conceived, which is reflected not only by the histological differentiation described above but also by vegetative morphology (leaves always obovate and clustered at the ends of the branches in *Mezilaurus*). Therefore, a fusion of the two genera should not be considered.

Moreover, since the shape of the cupule proves to be so important for the separation between the two genera, *Licaria mahuba* and *L. maguireana* should not be retained in *Licaria*. In addition, the flower structure of the former species, and especially the presence of exerted, downwardly bent stamens, is so unique within the Lauraceae that we propose reinstating its original generic status.

Clinostemon mahuba (Samp.) Kuhl. & Samp. Bol. Mus. Rio de Janeiro 4(2): 57. 1928. FIGURE 2.

Acroclidium mahuba Samp. Comissão Linhas Telegr. Estrat. Matto Grosso Amazonas, Publ. 56(Annexo 5, Bot. Parte X): 14. 1917. TYPE: Brazil, Pará, Gurupá, Várzea do rio Amazonas, in flower, *Ducke MG 16538 = RB 17582* (holotype, RB; isotype, P).

Licaria mahuba (Samp.) Kosterm. Rec. Trav. Bot. Néerl. 35: 123. 1938.

Misanteca mahuba (Samp.) Lundell, *Wrightia* 4: 100. 1969.

Although the floral characters of *Licaria maguireana* are less advanced (as evidenced by the retention of staminodes), it is clearly related to species of *Mezilaurus*. Since the lack of staminodes is the most important key character for the recognition of *Mezilaurus*, the inclusion of *Licaria*

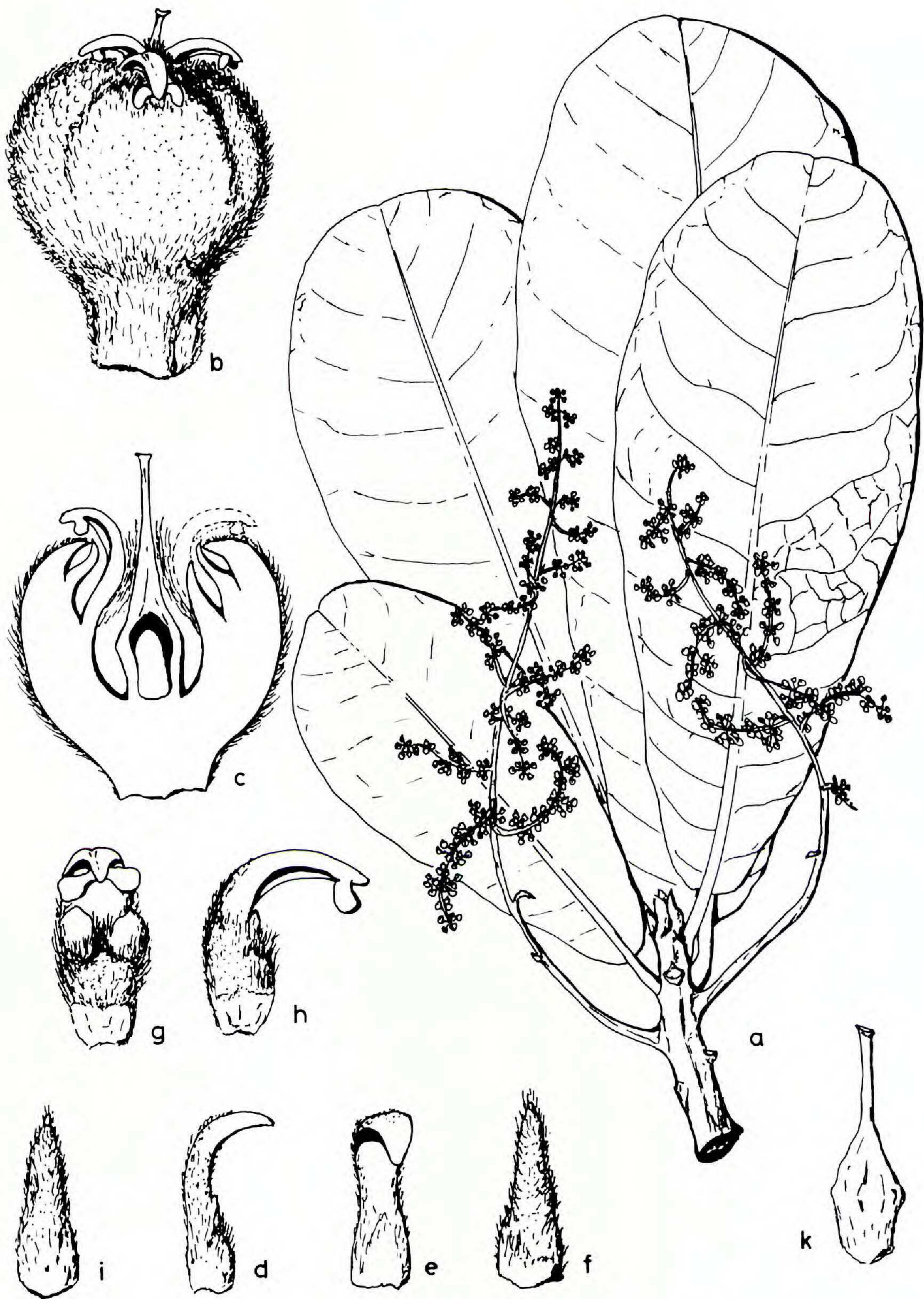


FIGURE 2. *Clinostemon mahuba* (from *Ducke 1234*): a, habit, $\times \frac{1}{4}$; b, flower, $\times 12$; c, longitudinal section of flower, $\times 12$; d, series I staminode, side view, $\times 25$; e, the same, dorsal view; f, series II staminode, $\times 25$; g, stamen, dorsal view, $\times 25$; h, the same, side view; i, series IV staminode, $\times 25$; k, pistil, $\times 12$.

maguireana in this genus would considerably disturb its hitherto clear definition. Now that the genus *Clinostemon* has been reinstated, including *L. maguireana* seems to be the most appropriate solution. We therefore propose the following transfer.

***Clinostemon maguireanum* (C. K. Allen) Kurz, comb. nov. FIGURE 3.**

Licaria maguireana C. K. Allen, Bull. Torrey Bot. Club 75: 315. 1948. TYPE: Guiana, Mazaruni Station, Forestry Dept. Brit. Guiana 2956 (F 220) (holotype, NY).

Misanteca maguireana (C. K. Allen) Lundell, Wrightia 4: 100. 1969.

The differences between the three genera under discussion can be summarized in the following key.

KEY TO THE NEOTROPICAL GENERA OF LAURACEAE WITH ONE WHORL OF BILOCULATE STAMENS

1. Cupule urceolate, double margined. Staminodes present or absent; stamens erect, with or without glands. Leaves narrowly elliptical or ovate, rarely obovate, evenly distributed along branchlets, rarely congested near apex, the lower surface glabrous, sericeous, tomentellous, or provided with single appressed hairs, never hirsute. *Licaria*.
1. Cupule pateriform. Leaves obovate or spatulate, congested near apex of branchlets, the lower surface glabrous or hirsute.
 2. Staminodes present; stamens erect or bent downward out of the flower, with or without glands. Leaves hirsute beneath. *Clinostemon*.
 2. Staminodes absent; stamens erect, without glands. Leaves hirsute or glabrous beneath. *Mezilaurus*.

The question of the relationship between *Licaria* and *Mezilaurus* within the Lauraceae remains to be considered. Originally, Kostermans (1938, p. 110) accepted a close affinity between the two genera, stating that the main differences were the existence of a hemispherical cupule in the former genus and of a small, pateriform enlargement of the fruit-bearing pedicel in the latter; the absence of staminal glands in *Mezilaurus* was considered of little value since *Licaria* comprehends species both with and without these glands. At the same time, Kostermans compared *Mezilaurus* with *Endiandra*, in which the fruit is attached directly to the pedicel.

In his later classification of the family, Kostermans (1957, p. 221 *et seq.*) placed more emphasis on the development of the flower tube and the fruit cupule than on any other features. Consequently, he placed *Mezilaurus* and *Endiandra* a considerable distance from *Licaria* in tribe Perseeae subtribe Beilschmiediinae. The wood-anatomical evidence shows, however, that the structural pattern of *Mezilaurus* has little in common with that of the genera assembled in Kostermans's subtribe Beilschmiediinae. This notion must inevitably lead to a reevaluation of the hierarchy of characters used in the classification of the Lauraceae and, eventually, to an improved system of classification.

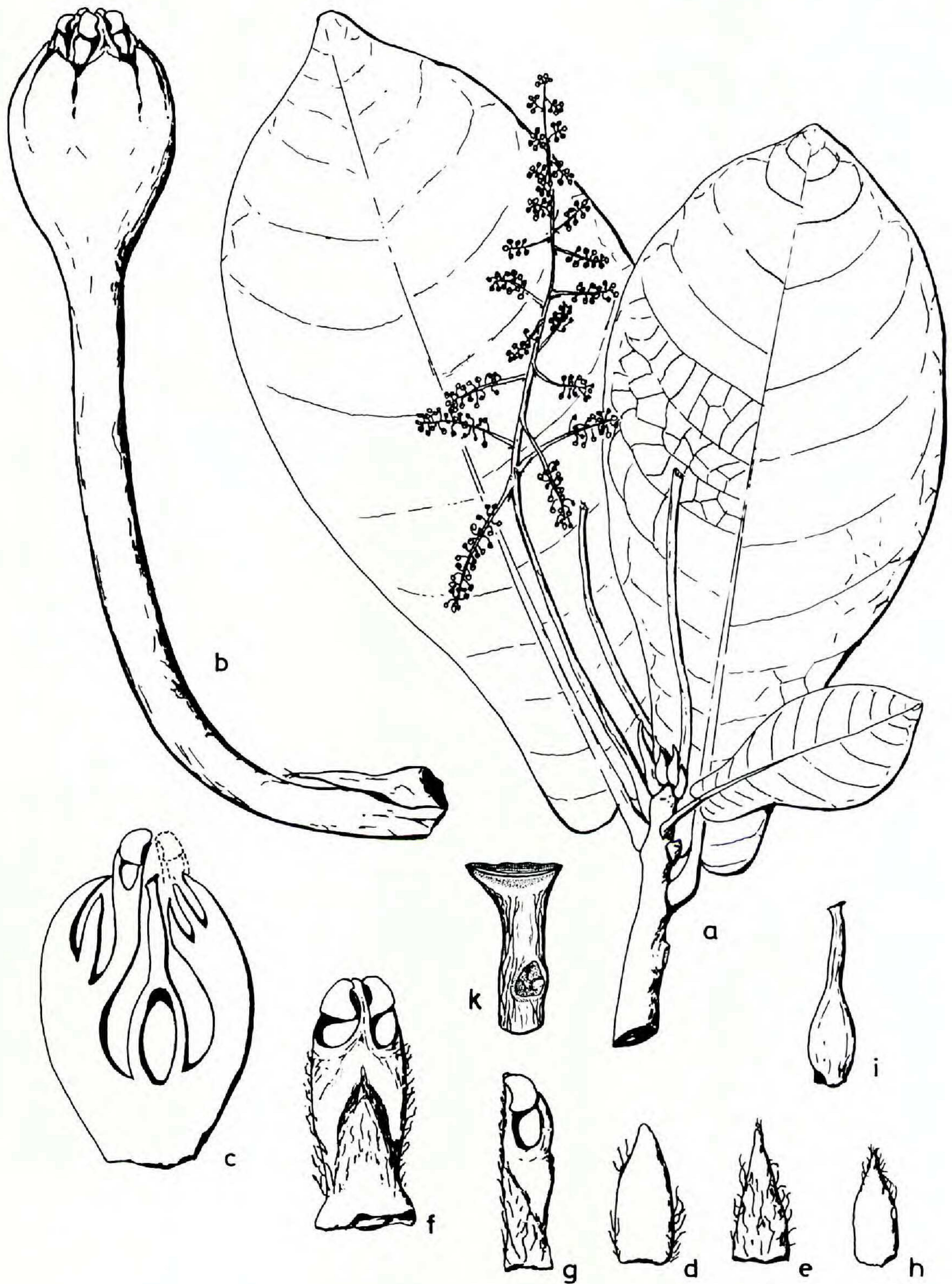


FIGURE 3. *Clinostemon maguireanum* (a-i from *Forestry Dept. Brit. Guiana 2956*, k from *INPA 15701*): a, habit, $\times \frac{1}{4}$; b, flower, $\times 10$; c, longitudinal section of flower, $\times 12$; d, series I staminode, $\times 25$; e, series II staminode, $\times 25$; f, stamen, dorsal view, $\times 25$; g, the same, side view; h, series IV staminode, $\times 25$; i, pistil, $\times 12$; k, cupule, $\times 1.5$.

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